

CLAIMS

1. A multiple replaceable reservoirs or cartridge for use with electrostatic spraying device of the type wherein at least one electrostatically sprayable material is contained in
5 a reservoir housing, the electrostatic spraying device comprising high voltage circuitry arranged so that, in use, the material issuing from the spraying nozzles in a direction away from said spraying nozzles forms an electrostatically charged spray, said spray having a high voltage and a polarity and wherein an electric field forms in the vicinity of the nozzles during use, the multiple replaceable reservoirs or cartridges comprising:

10 at least one electrostatically sprayable material storage region;
at least one replaceable or fixed spraying nozzles region;
at least one material conducting tube region connecting the material storage region to the spraying nozzles region, wherein during electrostatic spraying operations material flows from the material storage region to the spraying nozzles region either in
15 passive or user-induced arrangement; and

at least one nozzle-ring configuration for generating the electric field in the vicinity of the nozzles so that spraying from the nozzles is focused when the forward extremity of the nozzle-ring configuration is brought within a predetermine distance from an earthed target to be sprayed.

20 2. A method as claimed in claim 1 in which the nozzles is mounted in fixed relation to the body of the device and the nozzle-ring configuration is in the form of an annular cable mounted on the body of device in substantially concentric relation with, and usually in fixed relation to, the nozzles. The nozzle-ring configuration and the nozzles may however be adjustable with respect to one another in the direction of spraying.

3. A method as claimed in claim 1 in which the nozzles is mounted in fixed relation to the body of the multiple replaceable reservoirs and the nozzle-ring configuration is in the form of an annular cable mounted on the body of reservoir in substantially concentric relation with, and usually in fixed relation to, the nozzles. The nozzle-ring configuration
5 and the nozzles may however be adjustable with respect to one another in the direction of spraying.

4. A device as claimed in claim 2 wherein the tip of the nozzle is mounted in fixed relation to the body of the device and mounted at an arranged angle, typically of about 45 degree, to the axis of the body of the device.

10 5. A device as claimed in claim 3 wherein the tip of the nozzle is mounted in fixed relation to the top of the multiple replaceable reservoirs and mounted at an arranged angle, typically of about 45 degree, to the axis of the top of the multiple replaceable reservoirs.

6. A device as claimed in claim 2 wherein the tip of the nozzle tube is mounted in
15 fixed relation to the body of the device and mounted at an arranged angle, typically in the range of from 0 to 45 degree, to the axis of the body of the device.

7. A device as claimed in claim 3 wherein the tip of the nozzle is mounted in fixed relation to the top of the multiple replaceable reservoirs and mounted at an arranged angle, typically in the range of from 0 to 45 degree, to the axis of the top of the multiple
20 replaceable reservoirs.

8. A device as claimed in claim 2 wherein the multiple spraying nozzles units are mounted in fixed relation to the body of the device and to the body of an individual

reservoir, and several materials in electrostatically sprayable form may be released simultaneously for mixing and releasing at the multiple spraying nozzles units.

9. A device as claimed in claim 3 wherein the multiple spraying nozzles units are mounted in fixed relation to the top of each multiple replaceable reservoirs, and several
5 materials in electrostatically sprayable form may be released simultaneously for mixing and releasing at the multiple spraying nozzles units.

10. An electrostatic spraying device comprising casing housing a high voltage generator, a dispensing nozzles from which an electrostatically sprayable material is sprayed in use wherein when sprayed said spray had a voltage and a polarity, reservoirs
10 for containing materials to be sprayed in bulk wherein during use said reservoir contains bulk material to be sprayed, further comprises:

a pumping means for supplying said material through a passage leading to the dispensing nozzles, means coupling the high voltage output of the generator to the bulk material so that the voltage is conducted through the bulk material to the material present
15 at the dispensing nozzles whereby the material issuing from the nozzles under the influence of an applied voltage forms an electrostatically charged spray wherein an electric field forms in the vicinity of the nozzles during use, characterized by the provision of a nozzle-ring configuration on which a voltage of the same polarity as that applied to the material to be sprayed is developed in use, the nozzle-ring configuration
20 being located forwardly of the dispensing nozzles in the direction of spraying and arranged in such a way as to generate the electric field in the vicinity of the nozzles so that spraying from the nozzles is focused to prevent immediate loss of the charged aerosol and prevent spraying from the nozzles.

11. A device as claimed in claim 10 wherein the nozzle-ring configuration generates the electric field such that spraying from the nozzles is focused to prevent immediate loss of the charged aerosol and prevent spraying from the nozzles when the forward extremity of the nozzle-ring configuration is brought within a predetermine distance from an

5 earthed target to be sprayed.

12. A device as claimed in claim 10 in which the pumping means comprises means for pneumatically pumping said the material from the reservoir to the nozzle.

13. A device as claimed in any one of claims 10 in which pumping of the material is produced in response to operation of actuating means by the user.

10 14. A device as claimed in claim 13 in which operation of the actuating means is accompanied by priming of the passage leading to the nozzle outlet with the material in preparation for pumping.

15 15. A device as claimed in claim 14 in which operation of the actuating means is also accompanied by operation of a high voltage generator associated with the means for applying high voltage to the material to be electrostatically sprayed whereby all of these operations together with pumping of the material are effected in response to a single operation of the actuating means by the user.

16. A device as claimed in claim 14 in which pumping of the material and/or application of the high voltage thereto are affected in response to a separate operation of
20 the actuating means or operation of a different actuating means which effects pumping and/or electrostatically spraying.

17. An electrostatic spraying device comprising casing housing a high voltage generator, a special arranged dispensing nozzles from which an electrostatically

sprayable material is sprayed in use wherein when sprayed said spray had a voltage and a polarity, multiple replaceable or fixed reservoirs for containing materials to be sprayed wherein during use said reservoirs contain materials to be sprayed, means coupling the high voltage output of the generator to the material so that the voltage is conducted
5 through the materials to the materials present at the dispensing nozzles whereby the materials issuing from the nozzles under the influence of an applied voltage forms an electrostatically charged spray, further comprising a nozzle-ring configuration on which a high voltage of the same polarity as that applied to the materials to be sprayed is developed in use, the nozzle-ring configuration being located forwardly of the nozzles in
10 the direction of spraying and arranged in such a way as to generate the electric field in the vicinity of the nozzles so that spraying from the nozzles is focused when the forward extremity of the nozzle-ring configuration is brought within a predetermine distance from an earthed target to be sprayed.

18. A method as claimed in claim 17 in which the nozzles is mounted in fixed relation
15 to the body of the device and the nozzle-ring configuration is in the form of an annular cable mounted on the body of device in substantially concentric relation with, and usually in fixed relation to, the nozzles. The nozzle-ring configuration and the nozzles may however be adjustable with respect to one another in the direction of spraying.

19. A device as claimed in claim 17 in which the means for supplying said material to
20 the nozzles is operable to feed the material passively.

20. A device as claimed in claim 17 in which the means for supplying said material to the nozzles is operable to feed the material by a user-induced operation.

21. A device as claimed in claim 17 wherein said device further generates iontophoresis effect to enhance sprayed material transport through the skin until the forward extremity of the nozzle-ring configuration is within a distance of 2 cm from a human skin target or an earthed target.

5 22. A device as claimed in claim 18 wherein said device further comprises a source of high voltage and wherein the nozzle-ring configuration is composed of a semi-insulating material which is coupled to the source of high voltage, said semi-insulating material having sufficient conductivity to permit a potential to be established at a location forwardly of said nozzles which is of the same polarity as that applied to the material
10 emerging at the nozzles.

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